BGD-11-17729-2014 (MS No.: bg-2014-570)

Do climate factors govern soil microbial community composition and biomass at a regional scale?

Biogeosciences Discuss

Dear editors,

Thank you for your positive decision on our manuscript entitled “Do climate factors govern soil microbial community composition and biomass at a regional scale?”. We found the comments from reviewers are very constructive and helpful in improving the quality of this manuscript. We revised and partly re-wrote the manuscript based on comments and suggestions given by the reviewers. All changes were highlighted with color. The English language has also been improved carefully.

Below you will find our responses to the reviewers.

We appreciate your consideration of our manuscript.

Sincerely,

Linna Ma, Renzhong Wang

Responses to reviewer:

Referee #1

GENERAL COMMENTS: This manuscript “Do climate factors govern soil microbial community composition and biomass at a regional scale?” provides us useful information to better understand the microorganism dynamics in response to the global environmental factors at large scale in north-east China. The subject fits in the general scope of Biogeosciences. The manuscript is well written and easy to follow. The context provided was reasonable, that the experimental design is sound with a suitable statistical approach. However, the Results and Discussion sections can be strengthened to have the data better presented and possible mechanisms better

interpreted. I've made some suggestions for improvement below.

Abstract **The logics of the first sentences are not good, your objectives are to quantify how environmental factors affect soil microbial communities. Suggest the first sentence read as "Global environmental factors impact soil microbial communities, and further affect organic matter decomposition, nutrient cycling and vegetation dynamic." Lines14-17: Suggest change these sentences as "Higher contributions of gram-positive bacteria were found in wetter soils, whereas higher contributions of gram-negative bacteria and fungi in drier soils. The contributions of gram-negative bacteria and fungi were lower in heavily disturbed soils than historically disturbed and undisturbed soils." Please edit other similar sentences in this manuscript.**

Thanks for your suggestion. We have revised these sentences and corrected other similar sentences in the revised MS. Please see Line 27-28, 37-39, 264-267.

Introduction Page 17730, Line 24: add "regulating" after role in Page 17732, Lines 3-4: suggest read as "At regional scales, land use change is the major reason for spatial heterogeneity." The logics and structures of the first three paragraphs are very well. But at the last paragraph, the topic sentence at the beginning is not following the above paragraph well. Please re-organize this paragraph.

Thanks for your suggestion. We corrected these sentences and re-organized the last paragraph in the revised MS. Please see Line 48, 86, 100-109.

Materials and methods This section is well written, except a few minor errors: Page 17733, Line 3: add space before "44o36' N;" Page 17733, Line 18: change "deep decrease" into "large decrease"

Thank you. We added space before "44^{o}36' N"; and replaced "deep decrease" with "large decrease" in the revised MS. Please see Line 112, 126.

Results Page 17737, Lines 3-5: Change this sentence as "The first axis of CA ordination explained 27.5% of the variation in microbial community composition, mainly related to soil water gradients and management intensity (Fig. 2a and b)." Pleases also edit other similar sentences, I won't edit all of them. "3.4 Soil microbial biomass and contributions of microbial group" section is too long, although the description is clear. Some of the first three paragraphs overlap, please shorten these parts, and focus on your main points.

Thanks for your suggestion. We have revised these sentences in the revised MS. Please see Line 220-221, 229-230. 237.

We have shortened the "3.4 Soil microbial biomass and contributions of microbial group" section and focus on our main points. Please see "3.4 Soil microbial biomass and contributions of microbial group".

Discussion At the beginning, authors start your results directly. This is good structure in scientific paper. But I'd like authors to compare your general finding with previous studies to highlight your novel results. Suggest re-write the first paragraph. In the second paragraph, the first sentence is a repeat of your results. Please summarize this result as "Soil water availability is a main control on : : :.., which : : :.in our study(Fig. 5; Table 2) ". Please also correct and summarize your findings in other context in Discussion to avoid repeats of your results.

Thanks for your suggestion. We re-organized and partly rewrote Disscusion in the revised MS. In addition, we summarized our results in some paragraph. Please see Line 283-289, 312-313, 343-344.

Referee #2

The manuscript by Ma et al. investigates how microbial biomass and composition based on PLFA abundances is related to climatic, vegetation, soil and management factors at regional scale. Thereto the authors collected soil samples in a 850 x 50 km area along an East/West transect in North-East China from 23 locations and 7 land use

types from which they extracted the PLFAs and determined a set of soil chemical and physical parameters and gathered climatic information. The authors found that land use and soil water availability exerted a larger impact on soil microbial biomass and composition than the climatic gradient at that scale.

1) The topic is of relevance to the readers of Biogeosciences. The question posed is not highly novel and the introduction and discussion will benefit from putting forward a stronger framework and including more recent literature and clearly showing the novelty of the current work.

Thanks for your suggestion. Your comments have been fully considered in the revised MS. We carefully read the recent references, and rewrote the Introduction and Discussion. We put forward a stronger framework from recent literature and also clearly showing the novelty of the current work. Please see Introduction, Discussion, Line 55-56, 105-109.

2) The most recent paper cited is from 2012 (and only one from that year) while in the last few years very relevant literature has been published on the topic, some using PLFAs, some using sequencing approaches.

Thanks for your suggestion. We added 14 references which published recently in the revised MS. Please see Reference.

3) The methods used are valid and fairly well explained. However, the spatial structure aspect noted in the Statistical analysis warrant further explanation eg by demonstrating its value in a paragraph in the introduction.

Thanks for your suggestion. The detail method and information were added in the Introduction and M&M. Please see Line 77-85, 203-205.

4) The interpretations and conclusions are supported by the reported results.

Thank you.

5) The title could be more informative by stating which factors overrule the climatic factors;

Thanks for your suggestion. We corrected the Title.

6) the abstract captures the content of the manuscript well.

Thank you.

7) Throughout the manuscript the text should be thoroughly checked for grammatical errors and corrected.

The English language has also been improved carefully. All changes were highlighted with color.

We appreciate these helpful comments and suggestions that have helped us improve the quality of our paper.